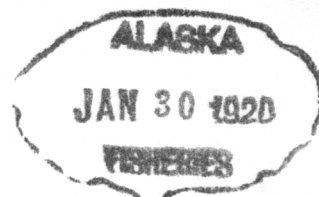


DEPARTMENT OF COMMERCE
BUREAU OF FISHERIES



General Report
on the
Fisheries of Central Alaska in 1919.

In 1919, the work of the field force in the central district of Alaska consisted of a patrol of the fishing grounds in the coastal waters and their tributaries from Controller Bay to Unimak Island, or the end of the Alaskan Peninsula. This work was inaugurated about the middle of May, at Cordova, and was discontinued at the end of October upon the completion of business pending before the district court at Valdez.

The central district may be divided along geographical lines into six distinctive regions each of which is a unit in itself and will be discussed separately at an appropriate place in this report. Because of my inability to cover the entire district, this report will necessarily be brief regarding conditions in such parts as were not reached.

From the beginning of the season to the end of June operations were confined chiefly to the eastern end of the district and for two reasons, namely, (1) the shortage of funds, and (2) the seemingly greater importance of the Copper River field where new regulations were to be enforced, the predicted effect of which constituted a bone of contention between some of the spokesmen of the packing interests and the functionaries of the governmental Bureau directly concerned. It is a regrettable fact that almost half of the district was not visited during the season. This was particularly distressing because more elaborate preparations for patrol than had ever before been made were undertaken as evidenced by the transfer of the Fisheries steamer Osprey and the detail of a Navy submarine chaser to the district. In spite of these greater facilities less of the district was covered than in any season since 1914.

Little attention was paid to the fur-bearing animals as the season was not propitious for such work. This work does not fit in with fishery patrols as it is peculiarly a work for the winter time, and if anything of real value is to be accomplished, it should receive the undivided attention of the field men. Now and then it is possible to obtain meager information about the fur farms in certain localities, but as a rule nothing is learned of the real character of operations.

Stream Watchmen.

Early in the season an arrangement was made with the Governor of Alaska whereby the services of Joseph A. Bourke, a special territorial officer, were secured to assist in the police work in central Alaska. Mr. Bourke was assigned to duty in the Copper River and Prince William Sound regions. He began work under this arrangement toward the end of May and devoted practically all his time thereto until the middle of September when he resumed his regular duties with the territory. Mr. Bourke made a good assistant though he was prone to deal hastily with the packers and fishermen if he thought their operations were not strictly in accord with the laws.

On May 26, Newt Casperson, of Cordova, was also employed as a patrolman and stationed at Miles Lake and Abercrombie Canyon where he represented the Bureau with dignity and fidelity until August 20 when he was released as the allotment of funds would not permit his further employment.

For want of means, no additional stream watchmen were engaged until the beginning of the fiscal year 1920. Kenneth C. Cole, of Seattle, was then employed and ordered to proceed to Cordova where he arrived July 8. He was assigned to Prince William Sound during much of the remainder of the month, using the last few days and the first part of August in visiting Cook Inlet. His work there was necessarily limited by lack of funds, for which reason much desirable data were not obtained. Mr. Cole returned to Seattle by the end of August after two months employment almost half of which was spent in traveling to and from Alaska. That this was true is a sufficient reason for the discontinuance of the employment of men in Seattle for work in central Alaska if they can not reach the district before July.

Kristof Lahz, of Valdez, was stationed at Eshamy Bay. He began work about the middle of July, or as soon as his transportation to Eshamy could be arranged. The period of his employment was brief, being controlled entirely by the amount of money available for such work.

On July 1, W. E. Baumann was placed in immediate charge of the work in the Afognak Reservation. He was authorized to issue licenses to the native fishermen in accordance with the order of March 21, 1912, and to supervise their fishing operations during the summer. He was assisted in this work by John J. Larson who was employed as an oarsman. This work was discontinued August 31.

John J. Folstad was stationed at Karluk as a stream watchman during July and August. His activities were confined exclusively to that place, where owing to the importance of the red salmon fishery protection to the run seemed best assured by the continued presence of a watchman there.

In June Warden H. C. Scudder was detailed from southeastern Alaska to the Ikatan region in which he spent a few weeks during the run of red salmon.

Some discussion of the efficacy of the stream watchman service may not be out of place at this time. The questions which naturally arise in connection with any scheme of stream protection are how to arrange the work so that it will result in the greatest good to the salmon and how that work can be best accomplished with a limited field force. Would it be better to station one man at each salmon stream giving him but a single stream to watch, or to give each one a boat and thus extend his supervision over a larger area? If the district is one where traps are used very largely a considerable territory can be effectively covered by one man provided he has a suitable boat. But in a region where movable gear is used chiefly the most good may be accomplished by stationing a watchman at each stream. He then becomes in fact a stream watchman and is appropriately so designated. In the other capacity he would be a patrolman. To what extent a lone watchman may prevent unlawful fishing is problematical but in the great majority of cases his presence on the ground will command respect for the law. In rare instances fishermen may be defiant and refuse to recognize his authority. At such time he would be helpless if alone for should he be able to ascertain the names of the fishermen and file complaint against them there would be nothing but his uncorroborated testimony upon which to build a case. Such a condition or situation is to be avoided as United States attorneys in Alaska dislike to undertake prosecutions on the evidence one man may give. Too often those not directly connected with the prosecution of cases lose sight of the fact that the burden of proof is on the Government and that the presumption of innocence is always given to the accused. Thus it would seem to be vitally important and necessary to secure reliable and sufficient evidence for the use of the prosecuting attorneys. In most cases this can not be done outside the personnel of the patrol force. Bystanders and disinterested persons if obtainable are disposed to avoid such things or to be utterly unreliable when called to testify. Frequently they are willing enough before grand juries but when brought face to face with the accused in a trial their evidence is materially changed. Positiveness gives way to doubt and too often their testimony becomes worthless.

Under ideal conditions watchmen would be assigned in pairs, but the day when such an arrangement can be followed seems very remote. The present order of things is largely a galloping from place to place giving each a passing glance without making observations of real value, and it will continue until a patrol is established in keeping with the responsibilities of the service.

Patrol Boats.

Extraordinary efforts to provide boats for the service were made to the end that the Fisheries steamer Osprey and one submarine chaser detailed by the Secretary of the Navy to fishery work were sent to central Alaska for patrol duty. In addition to these vessels, the gas boat Lily, an unregistered launch, was chartered for a few weeks' use on the Copper River flats. A similar boat was used three days on Cook Inlet. Patrol work in the Afognak field was carried on by means of a dory equipped with an outboard motor.

The Osprey made three cruises of Prince William Sound between June 15 and August 6, including one trip to Kodiak and return to Cordova which occurred between June 24 and July 5. By transferring this boat to central Alaska it was hoped that at last a vessel was available for use in all parts of the district, but this proved to be a vain hope for instead of being more useful than the smaller boats heretofore chartered in the same region, she was less serviceable and performed less work. One reason for this was that the Osprey is a coal burner with insufficient bunker space to carry enough coal for an extended cruise. Another reason, and probably the controlling one, was that the master of the vessel considered her unsafe for service in the open waters west of Seward. It was in just those waters she should have been of greatest service.

Subchaser 310 made one cruise through the eastern part of Prince William Sound as far as Valdez, and also a run to Kodiak. On the day of her arrival at Kodiak, she was ordered to Yakutat to suppress a reported uprising among the natives there, after which, or about July 2, she returned to Cordova. She performed no other service in the interest of the fisheries of central Alaska. About July 20, in the midst of the season, she left Cordova for Juneau, accompanied by the U. S. S. Vicksburg, her mother ship, which was then returning from Bristol Bay.

This boat, like the Osprey was desired for more extended use than cruising Prince William Sound. It was planned to send her to Cook Inlet in July during the run of red salmon but the commanding officer objected to this detail on the ground that it might be difficult to get fuel oil, and further that he was under orders to meet the Vicksburg at Cordova not later than July 20.

The limited experiences of the season in respect to the operation of this vessel showed beyond all doubt that such boats could be made most useful in our work. They would make really wonderful patrol boats having requisite speed and power and being seaworthy under the usual hazards of the sea, yet of shallow draft and capable of entering most all waters of the district. But under control of the Navy in so far as their general movements are concerned, and subject to the pleasures and whims of the commanding officers in their detailed operations, they will not render maximum service to the fisheries. In fact, the fisheries will get only such service as the commanding officers are disposed to give. The natural inclination of the officers and crew is to spend as much time in port as possible, and especially Saturday nights and Sundays. At such times each week the boats should be most active in the

field. Superficially at least, there was manifested by the officers of 310 a willingness to do what-ever was desired, but after the novelty of the work wore off they became somewhat indifferent.

Not until the Bureau has absolute control over the movement of boats engaged in its work in Alaska will the highest degree of service be attained. The co-operation of the Navy in the enforcement of the fishery laws of Alaska received much laudation at the beginning of the season and the press of the territory made appreciative comment on that fact from time to time, voicing the hope that such action would mark the inception of a system of patrol comparable to the importance of the fisheries. But toward the end of the season in summing up the work of the several navy vessels in Alaskan waters, it found little of real accomplishment to their credit. The withdrawal of these boats from Alaska long before major fishery operations ceased was ridiculed in no uncertain manner. It was also apparent that the officers and crews found it far more congenial to receive the entertainment and adulation of society in the towns along the coast than to spend their time in the inspection of fish traps on Sundays and the pursuit of seiners and gill netters at all times.

Territorial Fishery Activities.

The Legislature of Alaska, at its biennial session of 1919, appropriated \$80,000 for various uses in connection with the salmon fisheries of the territory. A part of this appropriation was expended in the improvement of salmon streams in central Alaska. Some unnamed streams tributary to the eastern part of Prince William Sound were cleared of drift wood and natural obstructions, thus enabling the salmon to reach the spawning grounds with greater ease, or opening new grounds to them. Bear Creek, the outlet of Bear Lake, near Seward, also received attention.

Mr. A. J. Adams, of Cordova, and Mr. Hugh Dougherty, of Seward, are the local members of the Territorial Fish Commission. During the summer, they had under advisement the establishment of salmon hatcheries in central Alaska, particularly Prince William Sound. With that end in view, an examination of Eyak Lake was made but no definite decision seems to have been reached in the matter.

Eyak Lake has the advantage of accessibility and it attracts a fair run of salmon but spawning area is very limited and practically restricted to the glacial wash at the head of the lake where the only important feeders enter. Possibly half a mile of this stream is used by salmon in spawning under anything but satisfactory conditions. The stream breaks into many branches as it flows across the glacial gravel deposits, especially during the season of freshets. Salmon spawn in all these smaller branches evidently preferring them to the larger ones but many of the eggs deposited in them will be lost by the streams becoming dry as the waters recede. A hatchery would doubtless correct this loss to some extent. The commissioners felt, however, that little permanent good could be accomplished until the lake was made fit for the

habitation of young salmon by the removal of Dolly Vardens and other predaceous fish. The difficulties presented in such an undertaking are large and will tax the ingenuity of those directly concerned.

While consideration is being given to a scheme for the extermination of the enemies of salmon, the territory, through its board of fish commissioners, should not overlook the probable effect of the establishment of a sawmill on the shore of Eyak Lake where no provision is made to prevent sawdust getting into the lake. A mill has been in operation on Eyak Lake several months. Dust from it was dumped directly on the shore and much of it eventually found its way into the water. A serious condition may result from a continuation of the dumping of sawdust into the lake if prompt action is not taken to the contamination which will inevitably follow. The run of salmon may be driven away from Eyak for want of public spirited cooperation in the prevention of a practice which will be inimical to the very interest which it is desired to foster. stop

Cannery Inspection by the Packers.

Alaska salmon packers were much wrought up over the action of the Government in the inspection of their 1918 pack and the rejection of a large part of it as being unfit for the use of the army and navy. Practically all packers were concerned and hundreds of thousands of cases of salmon were involved. Thousands of cans of salmon were opened and passed upon by inspectors of the War Department in Washington. Much of this work was done in the presence of the packers or their chosen representatives who were permitted to examine all samples. The Government's findings were that a large quantity of stale and putrifying fish had been canned and that the packers were in no position to defend themselves in the face of such a situation.

On account of this unsatisfactory situation, the National Canners Association, with which most of the packers are affiliated, took cognizance of conditions to the end that a cannery inspection service was inaugurated, Dr. E. D. Clark, of the United States Pure Food and Drug Laboratory at San Francisco, being selected as the active head. A score or more of young men were chosen as his field force whose duty it was to visit the several canneries in Alaska during the season of their operation. Apparently these inspectors were not assigned to any specific district but were given much latitude in their movements.

All canneries in the Cordova-Prince William Sound region were understood to have been visited by two or three of these men, each at a different time. Their inspection was of a somewhat varied character but more attention was given to the arrangement of plants regarding sanitation and fire protection than to the condition of the salmon being canned. What authority these men had to correct conditions appearing unsatisfactory to them is not known.

What recommendations or suggestions they made for the improvement of canneries and pack were not made public.

One instance was reported in Cordova where an inspector caused a lot of spoiled salmon to be dumped at the cannery of the Copper River Packing Company at McClure Bay, western part of Prince William Sound.

Good results will undoubtedly follow this inspection work if the field men are given authority to condemn spoiled fish and to prevent the canning of them, but as yet such authority has not been obtained. At this point the service is apt to be disrupted owing to the difference of opinion between the inspectors and the cannery superintendants regarding the degree of unfitness of salmon for canning, a situation which is most likely to exist where large lots of salmon are at stake.

Violations and Prosecutions.

One complaint for unlawful fishing was brought in the central district in 1919. It was filed by Special Assistant Joseph A. Bourke against the Moore Packing Company, charging it with the operation of a trap at Knowles Head, Prince William Sound, during the weekly close season on Sunday, June 15. The case was called for trial at Valdez on June 18. The defendant company pleaded guilty to the charge solely on the ground that it was responsible for the acts of its employees. The facts of the case were that the watchman closed the trap at the proper time but subsequently opened it thinking he was mistaken in the day of the week as the superintendent of the cannery had advised him that he would be at the trap at 11 a. m. Sunday, June 15. As he failed to appear at that hour, the watchman opened the trap. Shortly after the trap was reset for fishing, Mr. Bourke visited it and accordingly reported the matter to the United States attorney. The company was fined \$100 and costs of the prosecution amounting to \$46.30.

In September, at a short term of the district court at Cordova, the cases against the Carlisle Packing Company and the Canoe Pass Packing Company, indicted at Valdez in October, 1918, for the operation and construction of fish traps near Mountain Slough in violation of the statute requiring an end-wise passageway of 100 yards between all fixed fishing appliances, were tried before Judge Charles E. Bunnell and resulted in a conviction of both companies. The Carlisle Packing Company had operated three of these unlawful appliances, commonly referred to as double traps, for which it was fined \$450, or \$150 for each trap not constructed in accordance with law. The Canoe Pass Packing Company, having had but one such appliance, was fined \$150. In each case the costs of the prosecution followed the judgment.

At the Valdez term of court in October, the cases against the Alitak Packing Company and the Alaska Packers Association, on appeal from the commissioner's court at Kodiak, were disposed of. Jury being waived by both defendants, both cases were submitted to the court largely on the testimony

taken before the commissioner, transcript of which had been filed in the office of the clerk of the district court. The Alitak Packing Company was found guilty as charged in the complaint and was fined \$500 and costs amounting to \$569, the greater part of which was entailed in the trial before the lower court. This was a reduction of \$500 in the fine imposed by the commissioner at Kodiak.

The Alaska Packers Association was acquitted.

These cases involved the construction of two fish traps, one by each company, in Moser Bay, Kodiak Island, in 1918, within the prohibited distance of 600 yards of each other. The vital question at issue was whether the construction of one trap could be stopped by the subsequent commencement of another at a point inside the first structure and such action defended on the ground that at the time construction of the second trap was begun there was no similar structure laterally distant from it. This question was fully answered in the negative by Judge Bunnell in a memorandum decision handed down at Valdez late in October. In view of the importance of the question decided, this decision should be given publicity.

At the same term of court the case against the Northwestern Fisheries Company and the Canoe Pass Packing Company, jointly indicted on four counts for the operation of gill nets in Miles Lake in 1918 within the proscribed distance of other nets, was tried and resulted in a conviction on each count of both companies, each of whom was fined \$1,000 and costs, or \$250 for each count. Costs amounting to \$306 were charged against the companies, \$156 being paid by the Northwestern Fisheries Company and \$150 by the Canoe Pass Packing Company.

The Abercrombie Packing Company was also put on trial for a similar offense at Miles Lake in 1918, an indictment having been returned against it at Valdez in October, 1918. This case followed the trial of the companies already mentioned and as it concerned nets set within the prohibited distance of nets placed by them, the same testimony was given as in the preceding trial. Naturally a conviction could not be had in this case as the testimony clearly showed that the Abercrombie Packing Company was the first to set in three instances, with no convincing evidence against it in the other. Accordingly Judge Bunnell on motion of defendant's counsel instructed the jury to return a verdict of acquittal on counts one, three, and four of the indictment, whereupon the District Attorney moved the dismissal of the remaining count which was done.

Afognak Reservation.

As has been the custom since 1912, the fisheries of the Afognak Reservation received special attention. In April, Superintendent Edwin Wentworth of the Afognak fishcultural station was authorized to issue licenses to natives not exceeding 55 in number who desired to begin fishing before the end of June. On July 1, William E. Baumann, assisted by John J. Larson, took active charge of the patrol of the fishing grounds and exercised supervision over commercial operations in the reservation. He performed these duties from July 1 to August 31. Visits were made to all the fishing places on the island, including some of the lakes used by spawning salmon.

The bulk of salmon taken from Afognak waters was sold to the Kodiak Fisheries Company at Kodiak. The number so disposed of was 113,153 salmon of all species. This was a decline of 10½ per cent from the catch reported in 1918. Considered by species the following increase or decline was noted in respect to each: Cohos increased 102 per cent and were taken at three localities; humpbacks declined 67½ per cent, catches being made at five localities; reds increased 56 per cent and were taken at all localities except Litnik Bay which was not opened to commercial fishing until September and then only for cohos. The catch of chums and kings was so small as to be a negligible quantity. Litnik Bay produced half the cohos while Little Afognak furnished all but 35 of the remainder. No attempt was made to fish for them at any of the other streams.

There was some waste of salmon at Seal Bay, caused by the failure of the Kodiak Fisheries Company to send a collecting boat there at the proper time. Periods of four or five days elapsed in which collections were not made. This resulted in stale fish which necessarily had to be dumped. Responsibility for these losses was properly laid against the company. The primary cause was found in the fact that the company had too much territory to cover by the few boats it operated. The run from the cannery at Kodiak to Seal Bay and return by way of Paramanoff required twenty-four hours for the company's largest and fastest boat which occasionally was put on another run to the neglect of the most distant fields of Afognak. In view of this situation it would be better for the fisheries of the island if operations in the reservation were prohibited north of a straight line connecting Tonki Cape and Black Cape, such prohibition to continue from year to year until adequate facilities are provided for the collection of salmon north of that line.

Early in the season, before fishing began, the Kodiak Fisheries Company proposed to can the spent salmon at the Afognak fishcultural station in return for which it would build a wagon road from the head of Litnik Bay to the hatchery. This proposition was made voluntarily by the company. Without the road, delivery of fish at the bay would have been difficult, so it was to facilitate the company's own operations that construction of a road was proposed. The interest of the Bureau in the project was two-fold but somewhat conflicting. From the viewpoint of propagation the road would be a desirable

acquisition to the hatchery if it were built in exchange for the privilege of taking spawned salmon at Litnik Lake and at no cost to the Government. To that extent it was proper and expedient to encourage its construction. From the view-point of the Alaska Service, first consideration should be given to the product resulting from the canning of such fish which under the best conditions must be handled many times and subjected to rapid deterioration by being split. On one hand the Bureau was desirous of obtaining a road to facilitate the operation of its hatchery, on the other it was equally desirous that the standard of canned salmon should not be lowered by the utilization of fish which might be unfit for food. The company evidently concluded that there was too much risk in canning such salmon as nothing was done toward the building of a road.

Commercial catch of salmon in Afognak waters in 1919.

Locality.	Cohos.	Chums.	Humpbacks.	Kings.	Reds.	Total.
Little Afognak	5179	119	2112	.....	23335	30745
Litnik Bay	5203	.....	.....	.....	.....	5203
Paramanoff Bay	35	235	12334	.....	18568	31172
Malina	....	248	1098	22	23037	24405
Danger Bay	....	.....	5871	.....	27	5898
Seal Bay	.....	.....	1573	27	11634	13234
Izhut Bay	....	.....	....	.....	1973	1973
Pauls Bay	....	.....	....	.....	523	523
Total	10417	602	22988	49	79097	113153

The run of red salmon to Litnik Lake was unprecedentedly large. A capacity take of eggs was made while a sufficient number of salmon remained unstripped to have filled the hatchery a second time. This was a very gratifying situation and indicates that the run has recovered from the disaster of 1912 when it was almost wiped out by the eruption of Mt. Katmai.

Salmon Industry.

Mention has already been made of the number of geographical divisions into which Alaska naturally breaks by the centralization of fishery operations. In the order of their position from east to west, they are Copper River, Prince William Sound, Cook Inlet, Afognak-Kodiak, Chignik, and Morzhovoi-Ikatan. Information in respect to the regions west of Prince William Sound, except Afognak, is exceedingly meager as some were not visited at all during the season. This report is therefore limited to a discussion of operations in the eastern divisions.

Thirty canneries were operated in the district, three of which were new in the salmon industry. The net gain, however, was one, as two of the older plants were idle during the year. The number of traps in the district was approximately 178, which is a gain of about 30 per cent over 1918, the increase being chiefly in the Prince William Sound section.

Copper River.

The Copper River salmon fishery is preeminent among the fisheries of central Alaska. It holds this position by right of superior salmon, second to none in Alaska, and by virtue of the largest run of salmon of any stream in the district with the possible exception of the Karluk. It is primarily a red salmon fishery, though appreciable runs of king and coho salmon are also found there. Dog and humpback salmon are likewise taken but in numbers too small to be given the dignity of runs.

This field is otherwise attractive to packers. The runs begin at a comparatively early date, about the middle of May, and continue for barely more than six weeks. From the packers' point of view, there are also drawbacks but they are largely physical and not markedly different from those found at all streams carrying silt in great quantities which being constantly deposited at the mouth of the river have built up bars of sand and mud through which several outlets have been cut. This condition adds to the difficulty of navigation as the operation of boats is possible only between half tide and full tide. It was not an uncommon sight in 1919 to see at one time several boats stranded on the bars which they attempted to cross during an ebbing tide. Such mishaps have two effects; they disrupt boat schedules, and cause stale fish to be delivered at the canneries thus entailing inevitable losses.

Operators and Gear Used.

Seven companies took salmon from the waters of the Copper River delta. Two traps were operated on the flats, one each by the Canoe Pass Packing Company and the Alaska Sea Food Company, and approximately 65,000 fathoms of gill nets were used apportioned as follows:

Hoonah Packing Co. - - - - -	10,000 fathoms.
Eyak River Packing Co. - - - - -	10,000 "
Hillery-Scott Co. - - - - -	500 "
Pioneer Packing Co. . . . - - -	4,000 "
Carlisle Packing Co - - - - -	16,500 "
Canoe Pass Packing Co. - - - -	14,000 "
Alaska Sea Food Co - - - - -	10,000 "
Total - - - - -	65,000 "

In the up-river field there was one company, - F. H. Madden, successor of the Abercrombie Packing Company, which operated 52 dip nets in Abercrombie Canyon and 3,250 fathoms of gill nets in Miles Lake.

Thus the total amount of gear used in the Copper River in 1919 was 68,250 fathoms of gill nets, 2 traps, and 52 dip nets.

The catch of salmon by the respective companies was as follows:

Delta district.

<u>Operators.</u>	<u>Cohos.</u>	<u>Kings.</u>	<u>Reds.</u>	<u>Total.</u>
Hoonah Packing Co., - - -		92	96,386	96,478
Eyak River Packing Co., - -	24,356	771	121,733	146,860
Alaska Sea Food Co., - - -		2,352	129,933	132,285
Hillery-Scott Co., - - - -		17	1,442	1,459
Pioneer Packing Co., - - -		576	68,232	68,808
Carlisle Packing Co., - - -		2,931	392,258	395,189
Canoe Pass Packing Co., - -		2,150	261,427	263,577
Total - -	24,356	8,889	1,071,411	1,104,656
<u>Up-river district.</u>				
F. H. Madden - - - - -	15,778	4,092	157,597	177,467
Grand total - - -	40,134	12,981	1,229,008	1,282,123

Character and extent of operations.

As indicated above, fishing in Copper River is carried on chiefly by means of gill nets. They were used as stake nets, set nets, and drift nets. More than half this gear was operated as stake nets which were set on the flats exclusively there being a prohibition against their use in the sloughs

and within 500 yards of the mouth of each. Set nets were used in the protected areas after June 10, while drift nets were employed principally in drifting through the channels across the flats.

The nets were set for fishing early in May. The first salmon were taken about the middle of that month.

A change in the manner of setting nets was occasioned by a new application of the law whereby all stake nets were classed as fixed fishing appliances and therefore to be not less than 600 yards apart laterally. On account of this construction of the law Steamboat Slough was not fenced on both sides as in 1918. Stake nets were scattered across the flats for miles, extending from Alaganik Slough to Kokenhénic Bar, and in many instances were set out from the grass banks between the mouths of the sloughs. Grass Island was a favored locality for these nets, but very few were used east of Cottonwood Point.

The netters who preferred drifting operated chiefly in the main outlets of the river where they traversed the flats. Much of this fishing was carried on well out toward the sand bars. There was some fishing in the sloughs after June 10, but the majority of the fishermen continued the outside fishing by choice. A few set nets were put out in the sloughs at places where in previous years fabulous catches had been made, but results this season at such sets were very disappointing but for unaccountable causes.

Of the two traps operated in the delta district, one by the Canoe Pass Packing Company on the north side of Strawberry Reef, and the other by the Alaska Sea Food Company on the north shore of Egg Island, neither took many salmon. This region seems unsuitable to the use of traps, as much trouble was experienced by these companies in maintaining the ones they drove. Tidal currents, increased by the flow of the river, are very strong in the channels and pull heavily on the traps. In addition to that circumstance, the course of the current changes with the rise and fall of the tide and this affects the movement of the salmon leading them alternately to and from the traps. The Canoe Pass Packing Company especially encountered so much difficulty in the construction and maintenance of its trap that renewal another season will not be undertaken.

Salmon runs.

Red salmon began running at Alaganik and Pete Dahl Sloughs in appreciable numbers about the middle of May, and a considerable catch was made at Steamboat Slough before the end of the month. As the season advanced, better catches were made toward the eastward or middle section of the delta, particularly at Grass Island. No run appeared east of Cottonwood Point where in 1918 a large catch was made. An examination of the record of daily catch shown in the weekly reports of the companies indicates that the run reached its height on June 23, as the largest catch of the season, 38,125 salmon of all

species, was reported on that day. Thereafter the run declined rapidly until by July 8 it had practically ceased, though dribbling catches were made by the companies located nearest to the delta as late as the middle of August.

The writer did not get to see the up-river fields, but from reports made by those who visited them it appears that salmon were first observed passing through Abercrombie Canyon about May 20. Investigations made by Mr. Caspersen from May 26 to 31 showed that salmon in fair numbers were then passing up the river, ascent being comparatively easy as the river was only slightly affected by the spring thaw. As the run came early at the delta, it is fair to assume that a part of it reached Miles Lake by the middle of May. At that time the lake was covered with ice which, according to the cannerymen directly interested, would tend to stop the advance of the salmon, but the fishermen early in June voiced an opinion that the entire first run had gone by. This contention was far from the truth, however, and it was convincingly disproved by the fact that the run had not yet reached its height at the delta.

The largest single catch made on any one day at the lake and canyon occurred on June 28 when 5307 king and red salmon were taken. The best catches in the canyon were made between June 15 and 28 and between July 10 and 21, dip netting being interrupted by periods of high water. Fishing in the lake was best from June 19 to 29 and from July 16 to August 10. Of the total catch of salmon of all species from the Copper River, 13.8 per cent were obtained from Miles Lake and Abercrombie Canyon.

The regulations and their effect.

The order of December 20, 1918, effective January 1, 1919, met with general approval by the companies operating in the region of the Copper River delta. Those who commented on the regulations applicable to the lower part of the river favored a change to June 1 as a better date to begin fishing in the sloughs and the protected area at the mouth of each but they made no insistent demand for such a modification. All in all, they regarded the regulations as very good, permitting both a fair escapement and reasonable catch of salmon.

At Miles Lake and Abercrombie Canyon the situation was very different. Operators at those places protested vigorously against the enforcement of the regulations contending that the packing company at Abercrombie would be ruined financially as it could not possibly make a catch after June 15, the date on which fishing could begin. They contended that all the salmon would have escaped by that time. These representations were made even before the salmon began to run and at a time when no one knew what the run would be. The fallacy of this contention was amply shown by the records of the season from which it appears that a catch of 177,467 salmon was made, equivalent to 17,401 cases having a value of \$197,833. By the company's own estimate, the cost of operations, including wages, gear, etc., was \$136,058 leaving a net profit of

\$61,775 as the return for a three months fishing season. This profit exceeds the present value of the plant. Opposite the dire predictions and bitter wailings about financial ruin of this company may be set the statement that the third largest catch of salmon in 1919 was made at the up-river fields being exceeded only by the number taken on the delta by the Canoe Pass Packing Company and the Carlisle Packing Company, respectively, with three and four times as much gear and a much larger investment in boats and other equipment.

It will be seen from an examination of the foregoing statistics that the escapement of salmon at the delta was 177,467, plus an indeterminate number which avoided the nets in Miles Lake and Abercrombie Canyon. Employees of the packing company at Abercrombie made the unreasonable claim that millions of salmon had passed up the river before June 15 and that a considerable number ascended after that date. The latter conclusion is not questioned but the former was the wildest speculation. On a par with it comes the other statement that they could see salmon in countless numbers all the way across the river in the most turbid water, but such statements, made for the sole purpose of trying to show that the regulations were unduly drastic and should be modified, were not accepted by fair-minded observers.

The only uncontrovertible evidence which may be adduced to show the good effect of the regulations and that the escapement of salmon was greater than in 1918 is found in the results of fishing by the natives along the Copper River from Taral to Gulkana. During the entire season of 1918 these natives operated more than 30 fish wheels in that section of the river and secured approximately 7,000 salmon. In 1919, they used 28 wheels set at the same places as in 1918 and before the end of June had taken 24,295 salmon. If the run in 1919 was equal to that of 1918, - there is strong doubt that it was, - nothing could show more convincingly the need of the present regulations than the statistics of catch made by the Indians. In addition to the knowledge gained from the operations of the natives, there is the report of Dr. Henry B. Ward who made a special examination of several of the smaller tributaries of the Copper south of Chitina and extended his work to Long, Klutina, and Tazlina lakes at all of which places he found some salmon, but his report does not indicate that there was an ample or even adequate supply of spawning salmon in any of those areas.

Under the present regulations, the preservation of the Copper River salmon fisheries seems assured. Any modification of them which will open areas now closed to commercial fishing or which will reduce the proportion of salmon escaping to the spawning grounds is inadvisable. Such action should not be considered in the absence of proof that there is an excess of salmon over and above the needs of the run for its replenishment in lean years as well as in bountiful ones.

Prince William Sound.

The salmon fisheries of Prince William Sound struck a low level of production in 1919, there being an alarming falling off in the catch of all species, especially humpbacks of which the region is chiefly a producer. The slump in that species alone was approximately 60 per cent as compared with the catch in 1917, the year which brought the progenitors of the present run.

The development of these fisheries is of such recent origin as to furnish no data for fair and safe comparisons. If the run in 1917 was normal, then the situation in 1919 was discouraging and indicative of over-fishing two years previous; but if the run in 1917 was abnormal the run in 1919 may be regarded as more nearly representing the average and therefore indicative of a healthy condition of the fisheries. To entertain the latter view would be somewhat of a presumption as the consensus of opinion was that the runs in this locality had suffered serious depletion even in the two or three seasons since operations became intensified. Some cannerymen were outspoken on the subject and went so far as to suggest a closing of all canneries each alternate year to give time for the recuperation of the runs. They look to the future with no little concern, seeing an early suspension of all operations if the succeeding seasons mark further inroads into the runs. Constantly increasing cuts into the supply will shortly result in its complete exhaustion. Yet there are those to whom one thousand salmon appear as one million, and to such the lessened catch or the almost total disappearance of the salmon in a season when according to the theory of cycles pertaining to each species there should have been a large run means nothing as an over-abundance of confidence in the future would satisfy them of the return of the salmon in undiminished numbers another season.

Notwithstanding the uncertainty of the reappearance of the runs in their former strength, other companies are seeking an entrance into the field. It is now generally regarded as correct that two, possibly three, more canneries will be built on Prince William Sound in time for operation in 1920. One of these will be established by the Ellamar Mining Company at Ellamar, one by the King Salmon Fisheries Company at Unakwik Inlet, and the doubtful one by the San Juan Fishing & Packing Company at Sawmill Bay in conjunction with its herring saltery. These, with the probable reopening of the Northwestern Fisheries Company's plant at Orca will increase the number of canneries utilizing Prince William Sound salmon from 13 to 17. In addition to them, there may be two more, one to be built at Port Etches by the Hinchinbrook Packing Company, and the other, a floating cannery, by a Mr. Graham, formerly with the Alaska Sea Food Company.

The number of canneries in operation in this division in 1919 was increased by two over that of 1918, but the net gain was only one as the plant at Orca was idle during the season. The new companies to enter the salmon business were the Pioneer Packing Company, at Cordova, heretofore canning clams exclusively, and the Franklin Packing Company, at Sawmill Bay, which previously handled only herring.

The number of traps in Prince William Sound was increased from 22 in 1918 to 46 in 1919, a gain of more than 100 per cent. For the first time in the history of the salmon fisheries of this region, floating traps were used of which there were three. They proved to be remarkably effective traps and probably less costly to install than the driven ones. Their further introduction may be confidently expected.

Inspection of traps in this district during the weekly close period disclosed the fact that in every instance but one a very feeble attempt was made to comply with the law in respect to the closing of tunnels and the opening of heart walls. The law makes it mandatory on operators of traps that the heart walls be opened the full twenty-five feet so as to permit the free passage of salmon and other fish. It is just as mandatory in the closing of tunnels. Heart walls which are opened in a triangular manner so that the top of the opening is anywhere from five to twenty-five feet in width with the bottom of the opening converging to a point at or a few feet below the surface of the water are not regulated in accordance with law. Tunnels which are drawn back and not closed but gap open from one to four feet are likewise contrary to the law. But such has come to be the accepted manner of adjusting traps during the close periods; it has grown into a custom, reprehensible in the extreme, but highly satisfactory to the operators, being the next best thing to no regulation or closing at all, until now they tell you that the law demands the impossible. These contentions, if true, would reduce the law to an absurdity. The fact is that just so long as the operators are not molested officially in this indifferent and sloven adjustment of their traps they will continue to follow the course which is now acceptable to them.

The law does not require them to perform impossibilities. The reason they do not comply with it is that they find profit in doing otherwise. In this connection it is a pleasure to report that the Copper River Packing Company so constructed its traps that the heart walls could be opened the full twenty-five feet and lowered to a reasonable distance below the surface of the water at all stages of the tide, and the tunnels closed so that salmon could not enter the traps. Every Sunday its traps were models of perfect closings. This company deserves full credit for this demonstration of the practicability of a legal adjustment of traps during the weekly close period and it should receive the commendation of this Bureau for such action. It will not continue, however, to construct its traps in this manner if other operators are permitted to follow the old custom. They could not reasonably be expected to do so. This is a question of considerable moment to the field force of the Bureau as it is constantly brought in contact with the people of Alaska who see no reason why exceptions should be made for the benefit of the operators of traps.

Cook Inlet.

Little change from year to year is noted in the Cook Inlet district. The Surf Packing Co. built a small cannery at Tuxedni Harbor, intending to engage chiefly in the canning of clams which were said to be abundant in that locality. Nothing is known of its operations more than that in addition to the canning of clams it packed a few hundred cases of salmon.

The Alaska Ocean Food Company erected a cold storage plant at Port Chatham, primarily for the freezing of halibut from Portlock Bank but owing to delay in the completion of the plant this year's operations were confined to the dry-salting of Cod.

The Seldovia cannery of the Northwestern Fisheries Company was idle during the season, while most all salmon pickling by individuals was discontinued.

The run of red salmon was much smaller than in 1918, there being a falling off in catch of more than 40 per cent. If the seasons of 1918 and 1919 are alone considered, it would appear that the run is rapidly going to pieces, but if a comparison of the catches in 1915 and 1919 is made it will be found that the decline was at approximately the same rate, or 40 per cent less than the catch in 1914 and 1918. No alarm need be felt then because of the decreased catch in 1919 as every deduction which could be made from the records of past seasons pointed to the probability of a very small run. But if the catch in 1920 does not approximately double that of 1919, the red salmon run of Cook Inlet may be considered as in a precarious condition.

The run of king salmon has never been large, but it seems to be falling away steadily, the shrinkage between the catch of 1915 and 1919 being in excess of 70 per cent.

Traps continue to be the chief apparatus used for taking salmon and they account for fully 95 per cent of the catch. It appears from the best information available at this time that about 85 traps were operated in the district, or approximately the same as in the last few years.

Kodiak.

The salmon fisheries of Kodiak Island are always interesting, for among them ^{is} that of Karluk, one of the most noted streams in the world for red salmon. The red salmon streams at the south end of the island, including Red River, are not without singular interest, as they have long been contributing their share to the salmon production of Alaska. It is scarcely less than wonderful how they continue to yield good runs, particularly those in the vicinity of Olga Bay where operations are rarely interrupted by rough water. The situation should not be viewed with complacency, however, as the catch in 1919 was 43 per cent lower than in 1918 and 27 per cent less than in 1915. Red River differs from most other island streams in that it enters the Pacific Ocean at an unprotected point on the southwestern coast of Kodiak, for which reason it should need proportionately less protection than the more sheltered streams. But in spite of that fact, the run seems to have been injured, possibly by stream fishing. In 1915, there were 212,124 red salmon taken at Red River. Assuming that they were four year fish, the progeny of that run should have returned in 1919, but the catch in that year was only 80,375, a decrease in one cycle of 62 per cent. At the same rate of decline, it will be only another cycle until the run is wiped out.

The situation at Karluk is decidedly reassuring. Excepting 1916 and 1917, when the catch was 200 per cent greater than in any of the seasons immediately preceding, there has been but little fluctuation in the run of red salmon in recent years. As 1918 recovered from the low level of 1914 by a 64 per cent increase in catch, so 1919 shows a gain over 1915 of 31 per cent. This comparison is not made in an effort to show that the run increased by the percentages here given, but that conclusion is reasonably deducible from such evidence. There is virtually no change in the amount of fishing carried on at Karluk each year. Fishing is decidedly mechanical. Seines are laid out at about the same stage of the tide each day and in the same place unless the run is extraordinarily good. At such times the number of hauls will be increased and night fishing also will be carried on. If the catch increased ~~under~~ ^{under} ~~the~~ average conditions, it would be safe to say that the run was growing.

It will be intensely interesting to follow observations at Karluk through the next few seasons until the first ^{return} ~~run~~ of salmon after the year in which the hatchery was closed. The effect of artificial propagation at Karluk was regarded at all times as wholly negative, the run surviving neither for lack of hatchery operations or by virtue of them. The 80,000 red salmon which were annually corralled at the hatchery, half of which died before they were ready to spawn, can now go on to Karluk Lake and perform their life's function in nature's way and under ideal conditions. It is now believed that a healthy growth in the run of red salmon at Karluk is evident and will continue until conditions are materially changed.

There has been considerable discussion about the establishment of a salmon hatchery on Karluk Lake, and a very general unanimity of opinion exists concerning the project. It may therefore appear that any idea in opposition

to such a plan might be made solely for the sake of opposing something. This, however, is not the case. Artificial propagation of salmon as carried on for many years at five stations in southeastern Alaska and two in central has been repeatedly challenged to give evidence of its worth. We have been reminded that red salmon fry by the hundreds of millions have been planted in the waters of Alaska during the last twenty years or more, half of which were distributed in the southeastern district, and the question is invariably ask, what has been the effect of these plants, are there more red salmon now than there were twenty years ago, or are there as many as there were ten years ago? We are also reminded that the hatcheries at Loring and McDonald Lake have liberated hundreds of millions of young red salmon in the waters adjacent to each, but that the records of commercial fishing do not show that there has been an increase in the run in those localities to a degree at all commensurate with the work thus represented. As was recently pointed out by Mr. Charles D. Garfield, deputy collector of customs at Juneau, the failure to get positive results with red salmon in southeastern Alaska may have been due to a mistaken effort to propagate a species in a region where it does not thrive and never was very abundant. He also called attention to the fact that southeastern Alaska is essentially a humpback and chum salmon country and that such species can be artificially cultivated with assurance of success in increasing the runs.

To the westward it is different. The streams of Kodiak are primarily red salmon streams. It would therefore be desirable to give attention to the red salmon and to the localities which show signs of depletion rather than to those which are holding their own if not actually improving. Karluk belongs in the latter category.

The only observations made at Karluk Lake by the writer were in 1917 during a heavy run of red salmon. It was then found that a large number of salmon had spawned in the Karluk system of lakes and their tributaries under circumstances and conditions which in the main could not be improved artificially. The spawning beds were occupied by sufficient numbers of salmon to adequately replenish the stock.

The lake was again visited in 1919 by Dr. C. H. Gilbert and Mr. Henry O'Malley who reported that they saw only the lower part of it. They estimated the number of spawning salmon in the part examined by them at approximately 6,000. Inasmuch as they saw the end of the lake least used by salmon, it would be safe to say that the actual number of salmon reaching the principal spawning grounds would be several times the number reported by them. A conservative estimate would therefore put the number of spawners at twenty times 6,000, or 120,000 salmon capable of producing not less than 250,000,000 eggs. This may be regarded as a fair escapement of salmon in a season of normal run. Under such circumstances artificial propagation does not seem necessary or advisable.

There is no better field in Alaska than Karluk Lake where the sufficiency of natural production may be thoroughly tested. Conditions are most favorable at the present time, especially so since full legal protection is now given the stream. By the elimination of the hatchery on Karluk Lagoon which had been annually the cause of a heavy loss of adult salmon and by the prohibition of fishing in the lagoon, the chief causes of the assumed decline of the fishery were removed. To safeguard to the salmon the natural advantages existing in this region, it would be a splendid thing to set apart by Presidential Proclamation Karluk Lake and its catchment basin as a National Fisheries Reservation in which salmon would be allowed to live out their lives in the reproduction of their kind in like manner as the birds and game animals do in the many reservations created for them. It is now recommended that appropriate action to that end be taken in the near future. Nature has made wonderful provision for the salmon of Karluk by supplying them with ideal spawning grounds and other favorable conditions, so that it would be a real waste of funds to undertake to supplement natural processes.

But there are other regions, namely, Uganik, Red River, and Olga Bay, where fishcultural work should be undertaken as there is an obvious need for it. The runs are falling off in those localities in each of which there is an opportunity for artificial propagation to show its worth by renewing them. There can be no justification for the establishment of a hatchery in a region where it is not needed while other localities in which the runs are being depleted are in urgent and serious need. Neither should selection of a place for operations be made solely on the ground of its accessibility. The chief consideration must be the need of the fishery, other things being subordinated to that end.

Chignik.

This field presents one of the most anomalous fishery situations in Alaska. Year after year the yield of salmon is surprisingly uniform although there has been considerable variation in the time of the appearance of the runs, especially those of red salmon. More than once the packers were much concerned about the appearance of the salmon, yet at the last moment, as it were, the run began and attained large proportions and large packs were made. This eccentric movement of the runs has never been explained and is not understood. Only a few seasons ago the canneries were about to close as there seemed to be no promise of a run of red salmon, but to the surprise of everybody, it came and in greater volume than the most sanguine thought possible. Full packs were made by the three companies established at Chignik, and, according to their reports, a large surplus of salmon was left for reproductive purposes.

The pack of 1919 in this field may be slightly below normal, but there is no occasion for alarm over the condition of the fisheries of Chignik. Nevertheless it would be well to make a careful investigation of the situation as it now exists that preparation may be made for the time when artificial propagation will become necessary.

Herring.

The herring industry of Alaska received a setback in 1918 from which it did not recover in 1919. This condition affected pickling operations especially, irrespective of cure, and it may be due in part to two main causes. The first and least important was the importation of pickled herring from Europe, the second was the careless and indifferent methods of Alaskan packers.

After the cessation of hostilities in Europe, it was in order that the industries of the continent be rebuilt as speedily as possible and those of easiest rehabilitation received first attention. Among these were the herring fisheries. Food was needed urgently and the sea was ready to contribute its share. As soon as cargo space became available, the importation of European herring into New York followed as a natural consequence. Coming as a first-class commodity, packed in accordance with the known requirements of the trade, it found a quick sale in America in easy competition with the best product offered by American packers, and this was a disturbing fact to the packers in Alaska.

If the herring of Alaska are in all respects the equal of those of any other country, and easily obtainable, it would seem that any inferiority of the cured product in comparison with that from abroad could and should be chargeable directly to the carelessness of the curers. Timely warning was given to the packers that their Scotch cured product would be a drug on the market if it failed to measure up to standard requirements, but with that indifference which has characterized their operations ever since the Government began the introduction of the Scotch cure in Alaska, they gave little heed to the advice of recognized authorities but packed and cured each according to his own ideas. Energy in getting a mixture of salt and herring into barrels would have been commendable had it not been misdirected. As it was, this combination of salt and fish produced an article for which there was no demand. Packers became peeved because their fish could not be sold at their price. They complained to the Government and fussed about the Government because, after being encouraged and induced to engage in packing herring, dealers would not take their packs. They seemed to think it was the business of the Government to find a market for them but have nothing to say about the price at which the product should be sold. It apparently does not occur to them that the day has gone when an undesirable product can be dumped on American markets and sold in successful competition with high grade commodities. The consumer wants a certain thing and is not satisfied by the offer of inferior goods at the price of the best. If he must pay the top market price for Alaskan herring, he will demand a first-class article in return. Some packers learned the truth of that statement from the experiences of 1918 when they found no sale for their products. Others were not satisfied until they had received a second dose of the same medicine, which was effectually administered by the brokers and buyers in Seattle late in 1919. Large shipments

of summer Scotch cured herring from Alaska stood on the docks in Seattle literally begging for purchasers.

In 1919 there were only four packers in central Alaska who operated on a comparatively large scale. Of these the Franklin Packing Company ranks first in scope of operations and grade of products, its pickled herring being largely if not entirely Scotch cured. Its pack was handled under contract by a well known New York firm. The Franklin Packing Company has a large and well equipped plant at Sawmill Bay near Latouche where are carried on three lines of work, canning and pickling herring and salmon canning. The cannery seems to be reasonably spacious and conveniently arranged, with good docking facilities. The company has given more than ordinary care to the welfare of its employes in that a number of attractive bungalows were built for them in the spruce woods along the abrupt shore of the bay to the right and left of the cannery, giving to the whole a picturesque setting not often observed at canneries in Alaska. The owners of this cannery evidently believe in and act on the theory that a comfortably housed and contented working force makes for the success of their business. This course is worthy of emulation by all packers. Aside from the mercenary benefits to be expected from such action, further valuable gains in the loyalty of employes, many of whom were women, result from this humane treatment.

The San Juan Fish and Packing Company has a growing plant at Sawmill Bay now used exclusively for the handling of herring, packing both Scotch and Norwegian cures, besides furnishing a considerable quantity of bait for the halibut vessels delivering fish to the company's cold storage plant at Seward. It seems likely that this plant will be further enlarged by the addition of a salmon cannery.

The Everett Pacific Fisheries, located at Thumb Bay on the south end of Knights Island, packed herring by both the Scotch and Norwegian cures and put up several hundred barrels. Its product will probably grade high as apparently more than ordinary care was exercised in the curing and packing processes. Judging by the very large pile of herring under the fish house, selection should have been excellent as it was variously estimated that only one out of ten herring met the exacting requirements of the packer in charge of the plant. Even so and in spite of the waste resulting from such practices, it was better for him to disregard the accusation of wanton waste of food fish if thereby he could give the consumer a better article without endangering the supply of herring. This company was severely criticised for dumping so many fish, and the Bureau's representatives received a measure of criticism and censure for not filing complaint against it. Be that as it may, there could be no merit in bringing criminal action against a packer for trying to improve his pack by the elimination of unsuitable fish and he should not be blamed for refusing to handle that which would destroy his business.

The other packer in this district was the Aetna Fisheries, formerly the Driese Fisheries Company. Its plant was moved from Latouche Island to the

entrance of Sawmill Bay on Hoodoo Island. Its operations were well conducted and it made a gratifying pack.

Nothing is known of the operations at Halibut Cove in 1919. It was understood that several curers contemplated packing notwithstanding the uncertainty of market conditions.

At Kodiak, the W. J. Erskine Company and the Kodiak Fisheries Company packed a few hundred barrels of hard cured herring, in addition to which a few individuals also packed small quantities. Scattering packs were made to the westward near Chignik and the Shumagin Islands.

Clams.

The clam canning industry in central Alaska is declining rapidly if the results of operations in 1919 may be accepted as a criterion. Predictions made a few years ago when the first clam cannery was established at Cordova that owing to the limited area of the beds their early exhaustion might be accomplished are fast coming true. Of the three canneries which were opened at Cordova for the canning of clams exclusively, only one, that of the Pinnacle Rock Packing Company, remains so engaged. The plant of the Lighthouse Canning Company, the first to can clams in the central district, passed to the ownership of the Hillery-Scott Company of Cordova, and was converted into a salmon cannery. The Pioneer Packing Company, heretofore packing clams only, enlarged its plant and began the canning of salmon this year with the result that its clam operations were dwarfed by those of salmon canning.

In past seasons attention was called to the fact that the clam beds accessible to these canneries would be destroyed in a short time if they were not protected by close seasons or by the restriction of digging to specific areas each year. No action was taken to bring about that desired protection, and no voluntary withdrawals from the field were made by any of the companies engaged in the utilization of this sea food. The operators realized fully the seriousness of the situation and could see that it would be but a few years until they must accept one of two alternatives, the closing of their plants, or the conversion of them into salmon canneries. There would seem to be no doubt in their minds that this was the actual situation which confronted them in 1919, yet they were averse to making such an admission. Some of them attempted to account for the reduced pack by showing that during the periods of favorable tides digging was interfered with by storms causing heavy surfs on the beaches and thus hindering the work of the diggers. The diggers, however, were convinced that the supply of clams was less than in 1918 and that they experienced more difficulty in making wages this season except by increasing the pound rate for the raw product. Now and then there was a digger who by good luck in the selection of grounds or by exceptional industry and dexterity in manipulating the spade made more than ordinary wages, but the average return per man was rather small and other lines of work became more attractive. It was also true to some extent that the mere going to and from the beds was at times decidedly hazardous on account of dangerous tidal currents and surf, but that this was one of the chief causes of lessened production can not be maintained.

The razorback clam is the variety commercially obtainable in the Cordova district. It attains a size of from 10 to 12 inches in length and a weight of 1 pound. Though nothing definite is known regarding the age of this species when it shall have reached the size and weight above indicated, there is reason to presume that its life is not under 10 years if each ridge in the shell represents one year's growth. In 1919 clams averaging from 7 to 8 inches were taken chiefly, but smaller ones not exceeding 4 or 5 inches in length were also taken in considerable quantities. The removal of these smaller clams from the beds

entails a tremendous loss physically, biologically and economically. If permitted to live until a growth of at least 10 inches was made, they would have contributed to the replenishment of the species in several seasons, and then in their larger size would have become a more desirable commodity to both digger and packer. But in this case as in all others where natural resources having within themselves the power of selfrenewal are concerned little attention is given to the reseedling of the ground, but energies seem recklessly directed toward an immediate exhaustion of them. Under the present order of digging, all clams over 4 inches are retained and sent to the cannery. Since it requires as much time to uncover a small clam as a large one, and as the digger has no means of knowing their size before he digs them up he undoubtedly feels that all over 4 inches in length must be saved otherwise his labor goes unrewarded. While he would prefer to dig only large ones, the proportion of small ones is great enough to represent considerable loss to him if they are discarded, and it is equally true that as long as the small ones are accepted at the canneries he will be justified in saving them.

No practical solution of the problem here shown to exist suggests itself unless a change can be made in the manner of digging clams as might be possible by the use of an implement which would uncover several clams at one operation. The tool now commonly used is a narrow-bladed shovel. Rarely more than one clam is uncovered at a single operation. If a machine or tool could be provided which would bring up several clams at one time diggers could make wages without using the small ones and they would then be satisfied to return such to their beds. This segregation will not be made voluntarily, perhaps, so necessity arises for legislative action to prohibit the commercial utilization of clams under a specified length. In the absence of such a law, the packers could relieve the situation by refusing to accept or give credit for clams under a certain length- say eight inches. Though they might be required to pay a higher rate per pound to the diggers, they would lose nothing for the saving of labor in the cannery and the more rapid filling of the cans would amply compensate for the increased cost of the raw product.

The preservation of the razorback clams in the Cordova district may not be considered a matter of vital importance as only a small industry has been built up in connection therewith, but the subject merits comment as showing the trend of events where commercial enterprise becomes destructive in the absence of restrictive measures. A word of warning has the further effect of staying the voice of criticism which is inevitably heard when a natural resource is being inexcusably destroyed.

In April, 1919, the legislature of Alaska memorialized Congress to pass a law to prohibit the canning of clams in Alaska during their spawning season, but as yet the desired legislation has not been enacted.